3FLEX™ SIP-2101

Stereo Image Processor

User Manual

v1.0.2 – February 21st, 2012

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Revision History

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Intended Readers

Users, Operators

Subject

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Preface

This document contains instruction and reference information for the operation and use of the

3FLEX™ SIP-2101 Stereo Image Processor

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3FLEX™ SIP-2101 Stereo Image Processor User Manual

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European Commission (EC)
Waste Electrical and Electronics Equipment (WEEE) Directive

Do not dispose of this device. At the end of its life-cycle, this device must be properly recycled by a specialized recycling firm or returned to the manufacturer or vendor for proper disposal.

Finland

Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan.

Norway

Apparatet må tilkoples jordet stikkontakt.

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Apparaten skall anslutas till jordat uttag.

WARNING:

TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

CAUTION:

TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD AND ANNOYING INTERFERENCE, USE THE RECOMMENDED ACCESSORIES ONLY.

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(b) The "Warranty Period" begins on the date the Equipment is delivered and continues for 12 months.

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(d) This warranty is for the hardware and hardware sub-systems of the equipment and specifically excluded from the warranty is all software, (which is covered under the software warranty), problems due to accidents, misuse, misapplication, storage damage, negligence, or modification to the Equipment or its components.

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1.5 Obtaining Warranty Service and Customer Support

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- Our Customer Support Representatives are available to provide telephone support during business hours (M-F, 9am-6pm Pacific Time), and after these hours for urgent "emergency" technical support.
- Customer Support will be provided only for products under warranty or those covered under a valid Support Agreement.
- Before returning the Product for repair, it is necessary to obtain a Return Merchandise Authorization (RMA) number by calling (818) 333-3000. You will be asked to provide the system's serial number.
- The non-functioning part should be properly packed and shipped pre-paid to 3ality Digital with the RMA number clearly displayed on the outside of the package and on the accompanying RMA form. We will refuse to accept any package without a valid RMA number.
- Repairs outside the scope of the Limited Warranty require a valid and valid Support Agreement prior to any repairs. 3ality Digital does not offer time and materials based repair services.

2. Introduction

1.6 Purpose and Scope of this Manual

This manual describes mainly the chassis of the 3FLEX™ SIP-2101 and its specific features. The blade 3FLEX™ SIP-29B1 is only described as far as it is necessary in order to understand the chassis. Since the processing and I/O functionality of the SIP-2101 is mainly defined by the SIP-29B1 blade and this blade is used in a variety of chassis (e.g. 3FLEX™ SIP-2300 Field Stereo Image Processor or 3FLEX SIP-2900 19"/6RU MultiBlade Chassis), the SIP-29B1 blade is described in a separate manual.

1.7 Overview

The 3FLEX™ SIP-2101 is a stereo video processing device for High Definition (HD) digital video streams. Designed for production, post-production and exhibition environments, for both recorded and live situations, the SIP-2101 provides a number of functions designed to optimize stereoscopic image pairs and thereby improve the consumer's experience. Beyond Image-analysis and manipulation, the SIP-2101 seamlessly integrates with 3FLEX™ TS-x Stereo Camera Platforms (Rigs) and 3FLEX Stereo Platform Controllers (SPC´s) and other 3FLEX™ and 3SPACE™ products.

1.8 Enhanced 3FLEX™ SIP-2100

The 3FLEX™ SIP-2101 Stereo Image Processor is the successor of the very popular 3FLEX™ SIP-2100. It fully replaces the 3FLEX™ SIP-2100 and features the full functionality of the SIP-2100 with the following add-ons:

- 1U chassis with one removable 3FLEX™ SIP-29B1 processing blade
- Additional 12VDC power-input via 4pin XLR male receptacle

1.9 Description

The 3FLEX™ SIP-2101 is a 19"/1RU device intended for indoor use and installation in an equipment rack or on a tabletop. It can be powered either by AC power or by a 12VDC power-supply or battery-pack. The most important controls and features are described in the following chapters.

1.9.1 Front

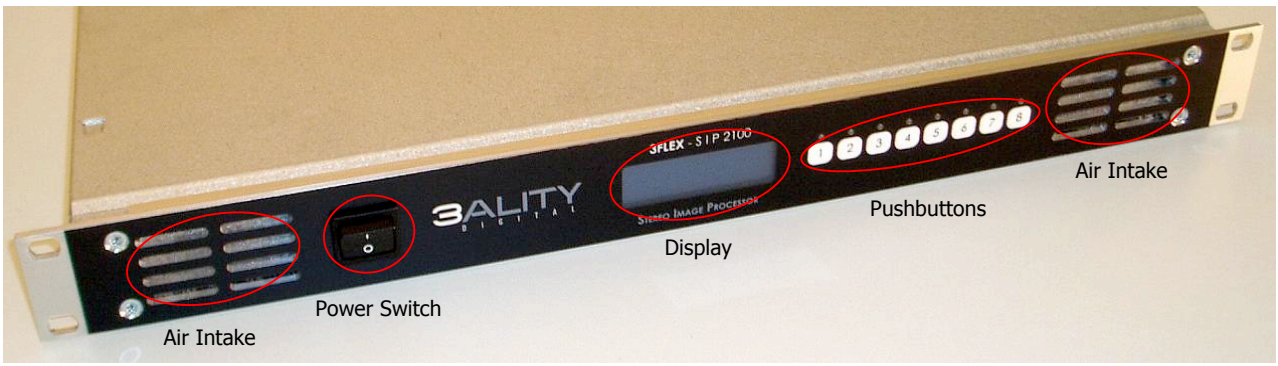


Figure 1. Front View

- Air Intake. Used to suck venting air into the unit for cooling purposes.
  - DO NOT BLOCK!
  - Make sure that no moisture is sucked into the device.
  - Replace filters if polluted

- Power-Switch. This is the main power-switch for both AC and DC power. If the unit is AC-powered, make sure that also the AC power-switch at the rear of the device is switched on.
- Display. LCD that shows useful status-information about the unit.
- Pushbuttons. If pushed, the respective preset in the 3FLEX SIP-29B1 blade is retrieved. Presets can be defined and stored remotely via the Web-interface or through the 3Flex-ControlCenter.

1.9.2 Rear

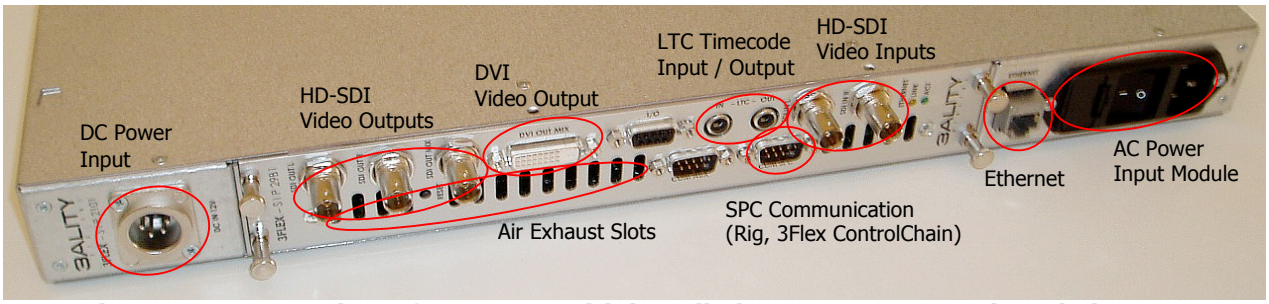


Figure 2. Rear View of SIP-2101 with installed SIP-29B1 Processing Blade

- DC Power Input. XLR male receptacle to power the SIP-2101 by a battery-pack or an external DC power-rail. Please note that in case that both DC and the AC power are connected, the AC input will be dominant.
- HD-SDI Video Outputs. BNC receptacles. Parts of the SIP-29B1 processing blade. Mainly used to connect video sinks, such as recording decks, video monitors, projectors, video switchers, video transmitters, etc.
- DVI Video Output. Part of the SIP-29B1 processing blade. Mainly used to connect a variety of 2D or 3D video monitors and projectors.
- Air Exhaust Slots. Part of the SIP-29B1 processing blade. Required to eject an air-flow, that cools the internal processing circuitry
    - DO NOT BLOCK!
    - Do not locate other heat-sensitive devices close to the exhaust of these slots.
- LTC Timecode Input / Output. RCA receptacles. Parts of the SIP-29B1 processing blade. Used to connect LTC (Linear Timecode) sinks or sources to the SIP.
- SPC Communication. D-Sub9 male connector. Part of the SIP-29B1 processing blade. Through this port the SIP can communicate with 3FLEX SPC's (Stereo Platform Controllers) and 3FLEX Stereo Camera Platforms (Rigs). This port is one endpoint of the 3FLEX ControlChain. The other endpoint is the rig. Within the 3FLEX ControlChain, multiple SPC's can reside.
- HD-SDI Video Inputs. BNC receptacles. Parts of the SIP-29B1 processing blade. Mainly used to connect video sources, such as cameras, playback decks, video switchers, video receivers, etc.
- Ethernet. Only operational if a SIP-29B1 processing blade is installed. Used to connect the SIP-2101 to a Ethernet LAN (Local Area Network). LAN connectivity is required and mostly used for remote device control, through e.g. the Web-interface or through the 3FLEX ControlCenter.
- AC Power Input Module. Grounded IEC male receptacle for universal AC power input. This module contains also a fuse holder and an additional power-switch.
    - Usually this power switch remains on and the power-switch on the front of the SIP-2101 is used.
    - If the fuse needs to be replaced, please make sure that it is replaced by exactly the same type as indicated on the serial-number-label of the device (European style Ø5x20mm, 250VAC, 2.5 Amps, medium speed).
    - Please note that in case that both DC and the AC power are connected, the AC input will be dominant.

3. Introduction

The brain of the 3ality Digital 3FLEX family lies within the Stereo Image Processor (SIP). Controlled via the integrated operator-panel or the internal web-based software and connected to both a 2D and 3D monitor, this multifaceted tool assists the entire crew, ensuring perfect 3D in every shot.

During rig prep, the camera operator uses the SIP to align tracking and sync lenses, ensuring near pixel-perfect matching during even the most complex moving shots.

The video engineer uses the SIP's integrated monitors to balance color, and keep it balanced during production.

On set, the stereographer refers to the SIP's multitude of viewing modes and analysis tools to monitor, assess and optimize 3D — on the fly.

In postproduction the SIP is most useful for quality-control purposes.

Finally the SIP can drive a variety of display devices in exhibition, while guaranteeing good 3D. Moreover it can help setting up projectors and screens in theaters.

A quick overview:

- Multiple views allow the stereographer to see point of convergence and maximum positive and negative parallax simultaneously
- SIP provides rig feedback information
- Analyzes and corrects mismatches between cameras
- Sophisticated lens and tracking alignment
- Integrated stereoscopic waveform and vectorscope monitors, as well as histograms
- Captures metadata every six milliseconds
- Output to a variety of 2D and 3D monitors concurrently
- Optimize 3D on the fl y
- Use floating windows for extra creativity
- Accommodates a number of frame rates, resolutions and stereo modes
- Outputs over DVI or HD-SDI

These are just more ways 3ality Digital gives you all the tools to be creative, while leaving the technology where it should be: in the background.

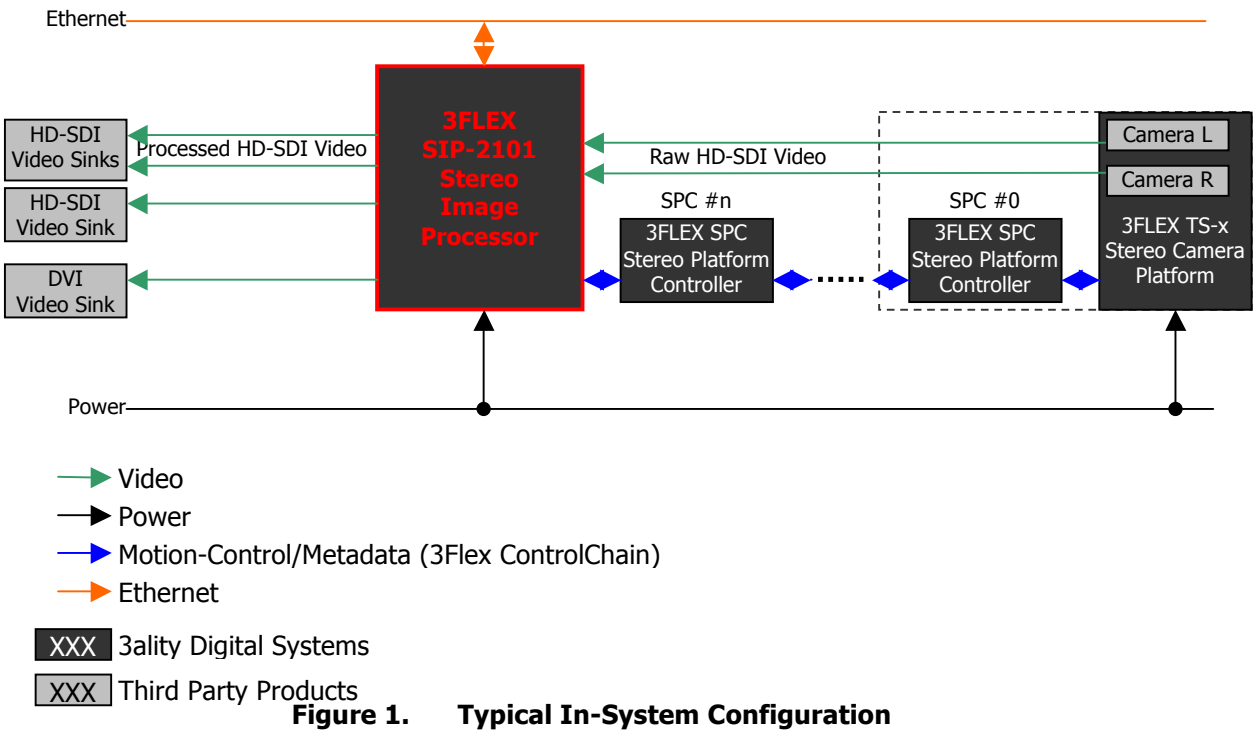


Figure 1. Typical In-System Configuration

4. Before you start

1.10 Safety

1. Operating may be done by qualified and trained personnel only.
2. Read these instructions.
3. Keep these instructions.
4. Heed all warnings.
5. Follow all instructions.
6. Do not use this apparatus near water.
7. Clean only with dry cloth.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not operate outdoors in direct sunlight.
10. Do not defeat the safety purpose of the polarized plug. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
11. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
12. Do not block venting holes.
13. Use only in ventilated and dry environment.
14. Only use attachments/accessories specified by the manufacturer.
15. Unplug this apparatus during lightning storms or when unused for long periods of time.
16. Beware of sharp edges, when installing a processing-blade into the chassis or when mounting the chassis into a 19” equipment-rack.
17. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply, its cord or its plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

5. Setup, Preparations, Maintenance

1.11 ESD Warning and Handling Hints

This product, like most microelectronic products, uses semiconductors that can be damaged by electrostatic discharge (ESD). Especially when handling the 3FLEX SIP-29B1 blade, care must be taken so that the devices are not damaged. Handling of the bare blade is required if the blade is removed from or installed to a chassis, such as the 3FLEX SIP-2101 chassis. Damages due to inappropriate handling are not covered by warranty.

The following precautions must be taken:

- Always store the 3FLEX SIP-29B1 blade in protective conductive packaging, when it is not installed in a chassis.
- Do not open the protective conductive packaging of the blade until you have read the following, and are at an approved anti-static work station.
- Use a conductive wrist strap attached to a good earth ground.
- Always disconnect the chassis from any power-supply and signal-source, when it is being worked on.
- Always discharge yourself by touching a grounded bare metal surface or approved anti-static mat before picking up an ESD - sensitive electronic component.
- Use an approved anti-static mat to cover your work surface.

1.12 Installing a Blade

Usually the 3FLEX SIP-2101 will be delivered to you with an installed SIP-29B1 processing-blade. However, empty SIP-2101 chassis can be ordered. If you want to install a SIP-29B1 processing-blade into a SIP-2101 chassis, make sure that the chassis is sitting firmly on a table - rear facing to you, that all connectors are disconnected and that the ESD hints above are observed.

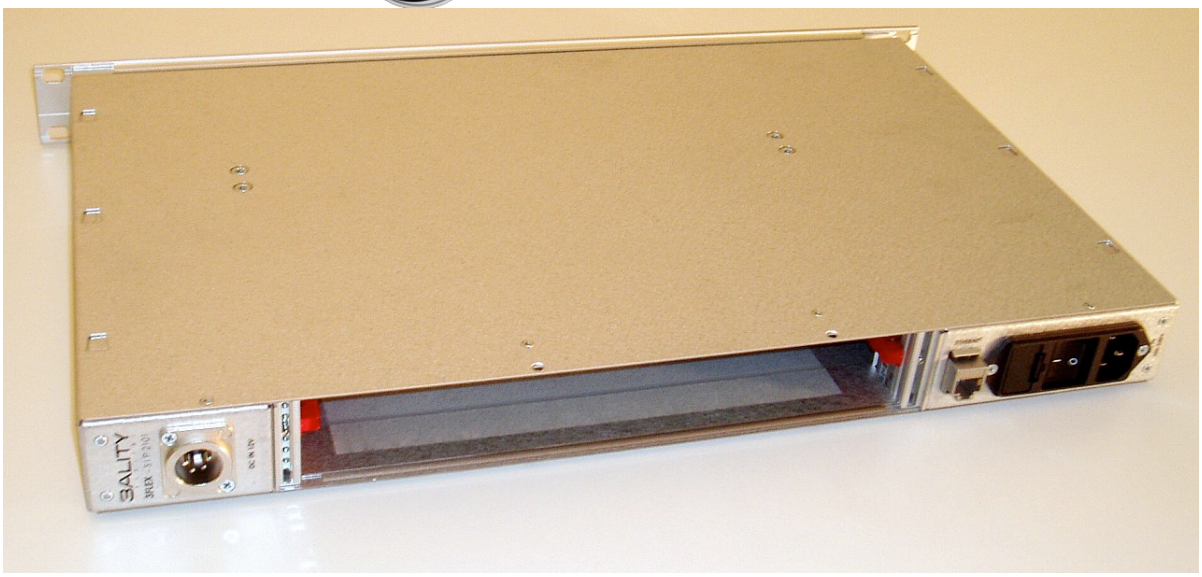


Figure 2. Empty SIP-2101 chassis, rear view

Then, unpack the SIP-2101 blade from its protective container and place it behind the chassis, fans facing up, as depicted in the following image:

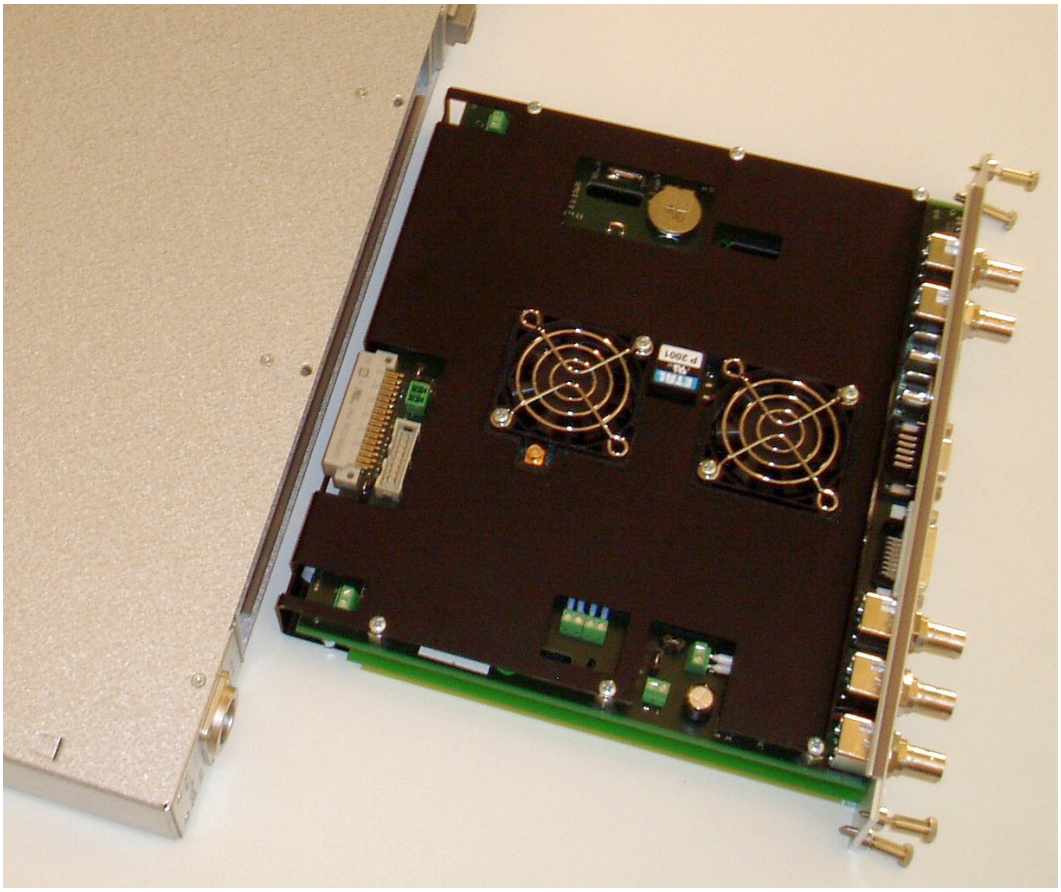


Figure 3. SIP-29B1 blade, ready for installation into the SIP-2101 chassis

Gently push the blade into the chassis, making sure that the upper printed circuit-board of the boardstack (I/O board) slots nicely into the red plastic rails on both sides, as depicted in the following photography:

Figure 4. Slotting the SIP-29B1 blade into the SIP-2101 chassis

Push the blade into the chassis. When the blade is almost fully inserted, with a clearance of about 1cm (1/2”), you will notice a resistance. This is, when the connectors on the chassis meet the mating connectors on the chassis’ backplane. Again, inspect if the alignment of the blade with respect to the chassis slots is perfect, and then press the blade firmly into the chassis.

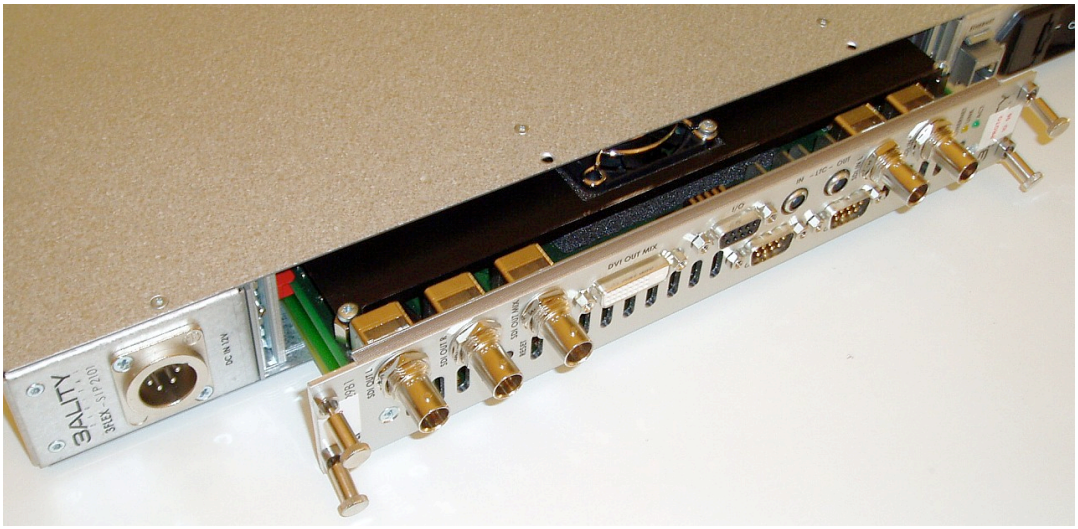


Figure 5. SIP-2101 chassis with partially inserted SIP-29B1 processing blade

Figure 6. SIP-2101 chassis with installed SIP-29B1 processing blade

Finally, fasten the four thumbscrews moderately.

1.13 Removing a Blade

Basically, if necessary, the removal of the SIP-29B1 processing blade from the SIP-2101 chassis is done in reverse order from the installation:

Make sure that the SIP-2101 is sitting firmly on a table - rear facing to you. Ensure that all connectors are disabled and that ESD hints are observed. Then loosen the four thumb-screws of the blade. Pull the blade out of the chassis by using the thumb-screws as handles. While the connectors of the backplane and the blade are still mating, this will require quite some force. After finally having removed the blade from the chassis, pack the blade in an ESD-rated protective bag or container.

1.14 Changing the Filter

The SIP2101 has two device fans placed behind the front plate of the enclosure. The air intake is covered by a white filter pad to withhold dirt coming from outside into the unit. These filter pads have to be replaced when they are filled with dirt. This can be identified normally by the color of the pads. Originally they are white and clean, dirt makes them gray and dark.

WARNING: Electrical Hazard: To prevent electric shocks, please disconnect unit from mains and battery power-supply before working on the unit!

For replacement of the two front fan filter pads, only the front plate has to be removed. This can be done by loosening the four screws (TORX 20) on the front plate. Carefully remove the front plate without stressing the cables to the switch and the display board. It is NOT necessary to disconnect the connectors. Carefully remove the dirty filter pads and discard them properly. Now insert clean filter pads. Place them into the cavity of the filter-holder, that faces the front of the SIP. Do **NOT** push them into the filter-holders too far, because otherwise the filter efficiency will be vastly limited.

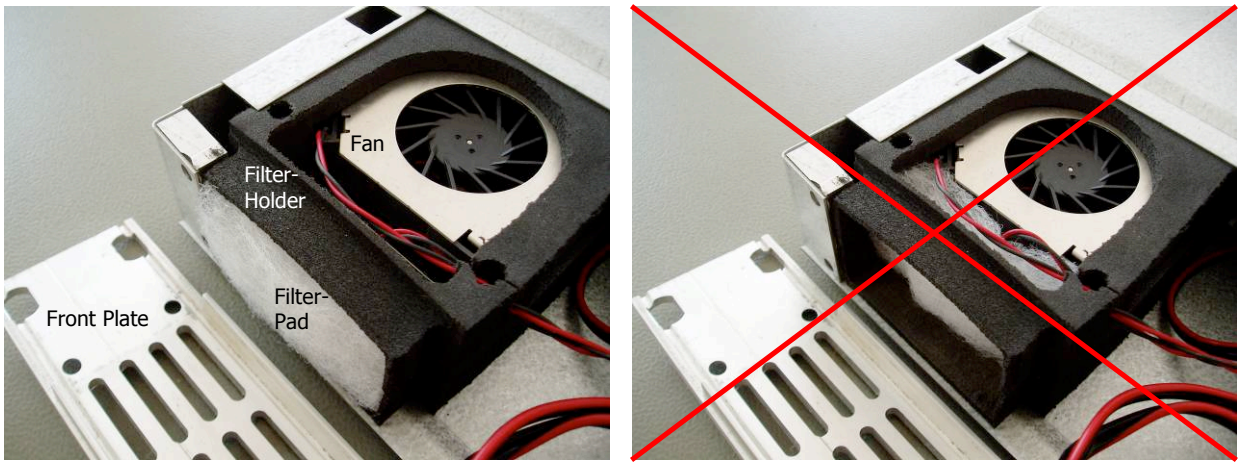


Figure 7. Correct and Incorrect filter positions

(For better clarity, the pictures show also the top cover removed. This is not necessary for normal replacement.)

The SIP2101 is not built for outdoor usage, but for inhouse office and studio usage! Don't use it in environments with high dirt grade. The unit has to be protected from such environment by additional equipment!

The order-number for one replacement filter-pad is: 3ALITY 502 001 00.

6. Specifications

1.15 Digital Signal Processing

Please note that these specifications for the digital signal processing refer to the 3FLEX SIP-29B1 Processing Blade, which is usually used in the 3FLEX SIP-2101 Stereo Image Processor.

1.15.1 Video Processing Chain

Color Space	YCbCr 4:2:2 – SMPTE 274m – ITU-R BT.709
Pipeline Bitwidth	10 bit per color channel, 20bit total

1.15.2 Sync Analyzer

Sync Range	± 1024 lines
Sync Accuracy	± 1 pixel

1.15.3 Geometry Analyzer

Total Disparity Range	X: ± 63 pixel Y: ± 16 lines
Detectable Height Misalignment	± 16 lines, if no other geometric misalignment
Detectable Rotation Misalignment	± 1° around image center, if no other geometric misalignment
Detectable Zoom Mismatch	± 2.5%, if no other geometric misalignment
Detectable Keystoning Angle	± 1°, if no other geometric misalignment
Detectable Depth	Disparity: 6.5% of the screenwidth, if no geometric misalignment

1.15.4 Image Alignment

Y Alignment Range	±32 pixel, symmetrical
X Preshift Range	±256 pixel, symmetrical

1.15.5 Wedge Corrector

Colorspace	YCbCr
Correction method	Between image top and bottom linearly interpolated matrix(3x3)+(1x3) for each (L/R) image
Gain range	± 2
Input Bitwidth	10

Output Bitwidth	10
Coefficient Bitwidth	12 (2 integer, 10 fractional)

1.15.6 Match and Artistic Color Corrector

Colorspace	YCbCr
Correction method	Matrix (3x3)+(1x3) for each (L/R) image
Maximum gain	± 4
Input Bitwidth	10
Output Bitwidth	10
Coefficient Bitwidth	16 (3 integer, 13 fractional)

1.15.7 Non-Linear 1D-LUT (Gamma)

Colorspace	YCbCr
Correction method	1D LUT
Input Bitwidth	10
Output Bitwidth	10

1.16 Connectors and Interfaces

Please note that many specifications for the connectors and interfaces refer to the 3FLEX SIP-29B1 Processing Blade, which is usually used in the 3FLEX SIP-2101 Stereo Image Processor.

1.16.1 HD-SDI video inputs

Standard	1.485 GBit/s SMPTE292M, SMPTE274M, SMPTE296M – 1080i/60, 1080i/59.94, 1080i/50, 1080p/30sF, 1080p/29.97sF, 1080p/25sF, 1080p/24sF, 1080p/23.98sF, 1080p/30, 1080p/29.97, 1080p/25, 1080p/24, 1080p/23.98, (720p/60, 720p/59.94, 720p/50)
Connector	BNC (female), 75Ω
Input Equalization	yes

1.16.2 HD-SDI video outputs

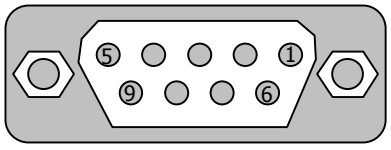
Standard	Same as input
Outputs	Two video data streams One view/mix data stream
Connector	BNC (female), 75Ω
Signal Voltage Swing	750 … 850 mV
DC Offset	AC-coupled output Do not apply external bias voltages below -3.7V or above 2.4V
Rise/Fall Time	HD: < 220 ps SD: 400 … 800 ps
Overshoot	< 8 %
Return Loss	n/a
Video Delay	At least 1 frame, never more than 2 frames, with respect to input. ±1 px between Left and Right HD-SDI output

1.16.3 I/O

Standard: RS-232C, DCE configuration

DSub9 pin female receptacle assignment

Pin	Function	Direction
1	CD (+12VDC)	Output
2	RxD	Output
3	TxD	Input
4	N.C.	-
5	GND	-
6	DSR (+12VDC)	Output
7	RTS	Input
8	CTS	Output
9	RI (GND)	Output



Rear-view on TB-2: Female D-Sub9 Receptacle

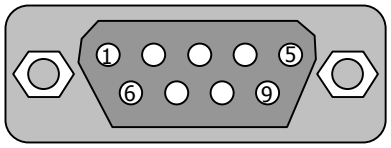
1.16.4 AUX, HOST

Standards: Software-Selectable:

- RS-232C, DTE configuration
- or RS-422/RS-485 (Pin assignments in Brackets)

DSub9 pin male connector assignment

Pin	Function	Direction
1	N.C.	-
2	RxD (RxD+)	Input
3	TxD (TxD+)	Output
4	N.C.	-
5	GND	-
6	N.C.	-
7	RTS (TxD-)	Output
8	CTS (RxD-)	Input
9	N.C.	-



Rear-view on TB-2: Male D-Sub9 Connector

1.16.5 DVI-Out

Standard: DDWG DVI 1.0 Spec.
DVI-D (digital interface support only!)
Only Displays with 1920x1080x60fps or 1920x1200x60fps are supported
No DDC support yet

Outputs: Mixed data (Left / Right / Overlay)

Connector: DVI

1.16.6 Ethernet

Standard: 100MBit/s (IEEE802.3 100BaseT)

Connector: RJ45

1.16.7 LTC IN

Standard: SMPTE 12M

Signal Level: 0.5V to 4.0Vpp unbalanced

Connector: RCA / Cinch (female)

1.16.8 LTC OUT

Standard: SMPTE 12M

Signal Level: 2Vpp unbalanced

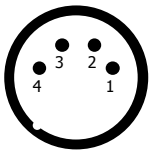
Connector: RCA / Cinch (female)

1.16.9 AC Power

Voltage	universal input : 100-240VAC nominal (85 – 264 VAC), 49-61Hz
Connector	IEC 60320-1, C14 (C13 required on cable)
Power	Approx. 40W
Priority	AC Power is dominant in case that both AC-Power and DC-Power are supplied to the SIP-2101

1.16.10 DC Power

Voltage	12VDC -20%/+40% (9.6V-16.8V)
XLR pin assignment	1 0V 2 n.c. 3 n.c. 4 +12V



Rear view on TB-2: XLR-4pin connector

Power	Approx. 50W
Priority	AC Power is dominant in case that both AC-Power and DC-Power are supplied to the SIP-2101

1.17 Physical

Dimensions	19” standard compatible • Enclosure width: 450mm (17.8”) • Frontface width: 483mm (19”) Height: 1RU = 44mm (1.74”) Depth: 310mm (12.2”) including connectors on SIP-29B1 blade, without attached cables.
Weight	Without Blade: approx. 3.5 kg (7.7 lbs) With SIP29B1 Blade: approx. 4.5 kg (10 lbs)
Operating Height	< 2500m above sea level
Operating Conditions	Temperature 0 °C min. , 35 °C max. Rel. Humidity 20% … 80% (non condensing)
Storage Conditions	Temperature -5 °C min. , 45 °C max. Rel. Humidity 0% … 80% (non condensing)
Ingress protection	IP20 / NEMA 1
RoHS compliance	YES

7. Appendix

1.18 Declarations of Conformity

1.18.1 CE

CE

EC Declaration of Conformity

Address:	3ality Digital Systems GmbH Gut Mergenthau 86438 Kissing Germany
Product:	Stereo Image Processor
Model:	SIP 2101

The product complies with the requirements of the following European directives:

2004/108/EC	Electromagnetic Compatibility (EMC)
2006/95/EC	Low Voltage (LVD)

Compliance was proved by the application of the following standards:

EMC:	EN 55022:2006 + A1:2007 EN 55024:1998 + A1:2001 + A2:2003
LVD:	EN 60950-1:2006 +A11:2009 +A1:2010
Year of CE marking:	2011

Kissing, July 21. 2011

ppa. Christian Ebhardt / General Manager

Name, Position

Figure 8. CE Declaration of Conformity

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